

THE PORT AUTHORITY
OF NY & NJ



ORIGINAL SIGNED & SEALED BY
N.Y. P.E. (OR R.A.)

Joseph R. Long
& Associates, Inc.
consulting engineers

One Pennsylvania Plaza
New York, New York 10048
Tel. (212) 512-7400, Fax (212) 512-7382

THE OFFICE OF
BRIAN
ELIOT
LEBOWITZ

REGISTERED PROFESSIONAL
ENGINEER - CIVIL
NEW YORK, NEW YORK

LESLIE E. ROBERTSON
ASSOCIATES, R.L.P.
CONSULTING ENGINEERS
20 EAST 47TH STREET
NEW YORK, NY 10017
TELEPHONE: 212-697-0000
FAX: 212-697-0000

I HEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT
COPY OF ONE OF THE CONTRACT DRAWINGS FOR
SERVING A PART OF CONTRACT NO. WTC-945-071
IN THE FORM IN WHICH SAID DRAWINGS EXISTED AT
THE TIME THE SAID CONTRACT WAS EXECUTED BY
THE PARTIES.

DATE 11/16/98
SIGNED BY
P.L. Long
ENGINEER OF DESIGN

11/17/97
AS-BUILT
TYPE D3
RZ

11/17/97
ISSUED FOR BID

No. Date Revision Approved

Engineering Department
Design Division

The World
Trade
Center

STANDBY POWER
5 WORLD TRADE CENTER

STRUCTURAL

TYPICAL DETAILS

This drawing subject to conditions in contract.
All inventions, ideas, designs and methods
herein are reserved to Port Authority and
may not be used without its written consent.

WVS JAL RZ
Designed by Drawn by Checked by

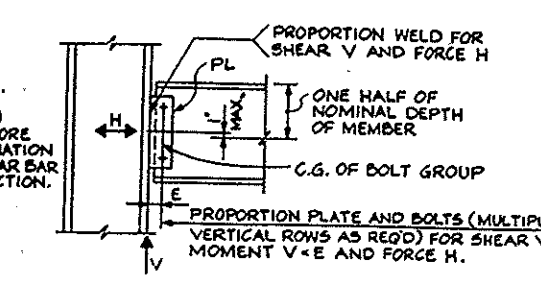
Date 11/17/97
Scale

Contract Number WTC-945-071
Drawing Number ST-01

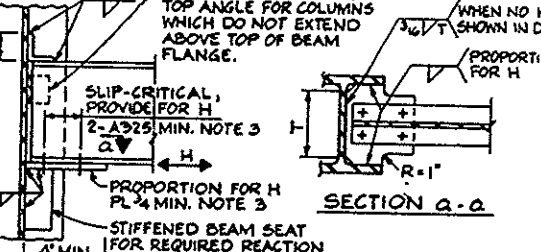
MINIMUM WELD SCHEDULE	
MATERIAL THICKNESS OF THICKER PART JOINED	MINIMUM WELD
3/4" AND LESS	1/4"
OVER 3/4" TO 1-1/2"	5/16"
OVER 1-1/2" TO 2-1/4"	3/8"
OVER 2-1/4" TO 6"	1/2"
OVER 6"	5/8"

NOTES:
UNLESS OTHERWISE NOTED IN THE STRUCTURAL DRAWINGS, WELDS SHALL BE
OF THE SIZE NOT LESS THAN GIVEN IN THE SCHEDULE.
NOTATION IN THE DRAWINGS SHOWS "MIN" ASSOCIATION WITH THE
APPROPRIATE FILLET OR PARTIAL PENETRATION WELD SYMBOL. FOR EXAMPLE:
MIN PP MIN
THE MINIMUM WELD SIZE APPLIES TO THE LEG DIMENSION OF FILLET WELDS
AND TO THE MINIMUM EFFECTIVE THROAT OF PARTIAL PENETRATION GROOVE
WELDS.
THE MINIMUM WELD SIZE NEED NOT EXCEED THE THICKNESS OF THE
THINNER PART JOINED UNLESS A LARGER SIZE IS REQUIRED BY CALCULATED
STRESS.

(A) WELDS



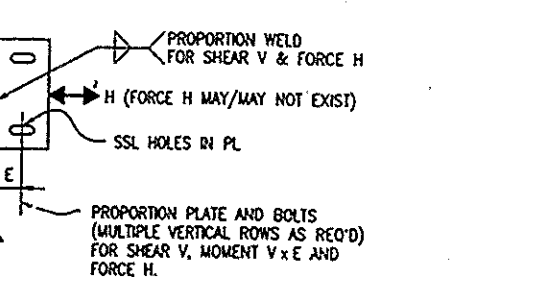
BEAM OR GIRDER FRAMING TO W COLUMN FLANGE



BEAM OR GIRDER FRAMING TO W COLUMN WEB

NOTES:
1. PROVIDE ADDITIONAL COLUMN WELDING AND/OR INTERNAL
DIAPHRAGMS OR PLATES AS REQUIRED BY CONNECTION FORCES.
2. TOP FLANGE PLATES MAY BE USED AT THE CONTRACTOR'S OPTION.
IF TOP PLATES ARE USED, PROVIDE STEEL DECK SUPPORT PLATES.
3. MINIMUM REQUIREMENTS SHOWN ARE TO BE PROVIDED
EVEN WHEN NO H IS INDICATED IN DRAWINGS.
4. WHERE NOTED THUS $\frac{H}{4}$ IN DRAWINGS, H IS TO BE TAKEN
THROUGH THE TOP AND BOTTOM FLANGES OF THE BEAM.

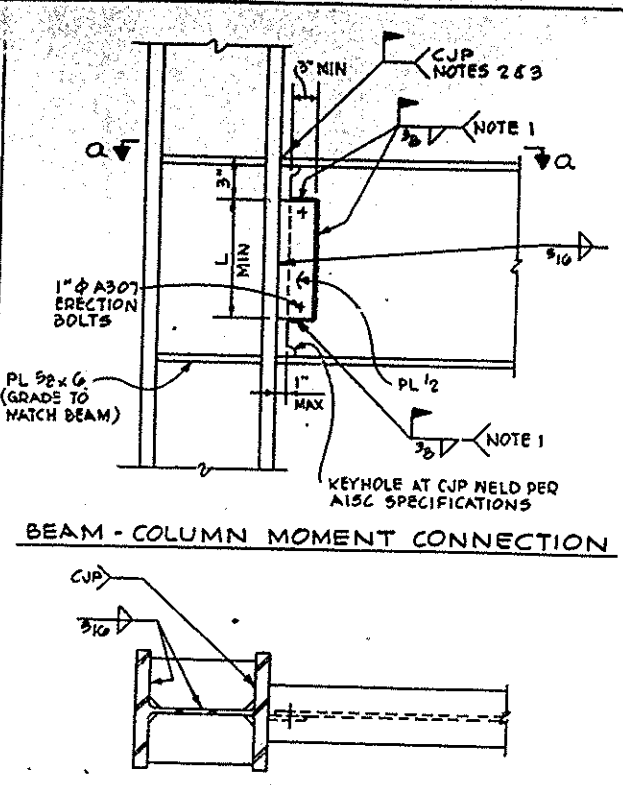
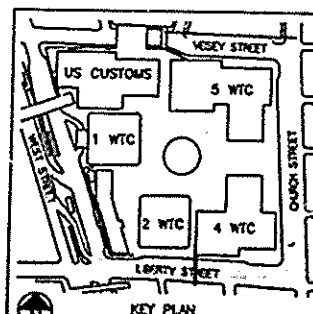
(B) CONNECTIONS



BEAM END SHEAR BAR CONNECTION DETAIL

CONTRACTOR'S OPTION TO PROVIDE STANDARD ROUND
HOLES IN CONNECTION PL OR SHORT-SLOTTED HOLES
AS SHOWN ABOVE.

(C) CONNECTIONS

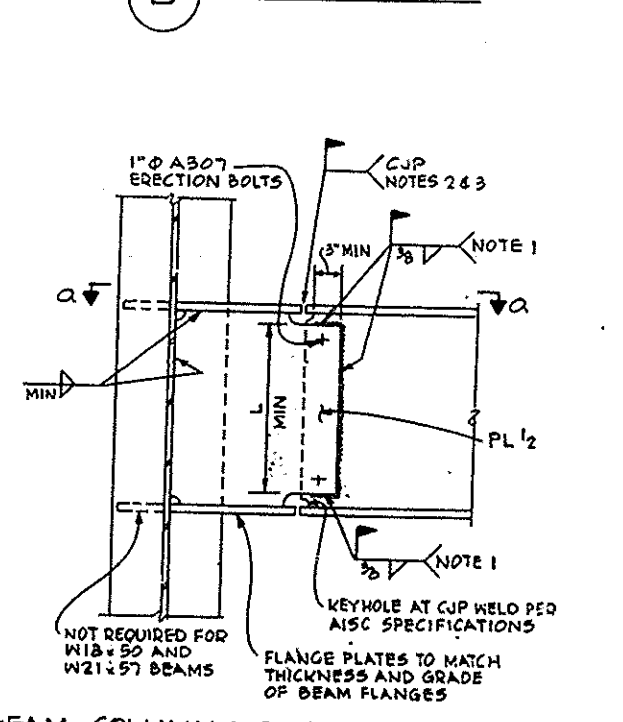


BEAM - COLUMN MOMENT CONNECTION

TABLE	
BEAM SIZE	L
W27x84	18
W27x84 FY50	21
W18x50	12
W18x50 FY50	12
W21x57	14

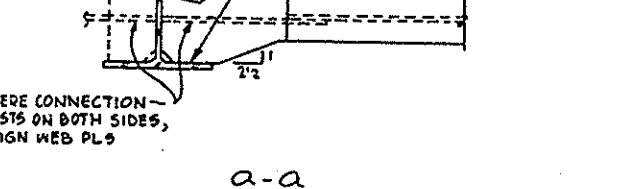
NOTES:
1. REFER TO TABLE FOR WELD LENGTH.
2. WELD FROM BOTH SIDES. WHERE DAWNING BAR IS
USED REMOVE BAR, BACK GROUT, WELD FLUSH
AND ADD A 1/8" REINFORCING FILLET WELD.
3. USE RUN-ON AND RUN-OFF TABS. REMOVE TABS
AFTER WELDING AND FINISH TO SMOOTH CONTOURS
PER 3.12.3 OF AWS D1.1-94.

(D) CONNECTIONS

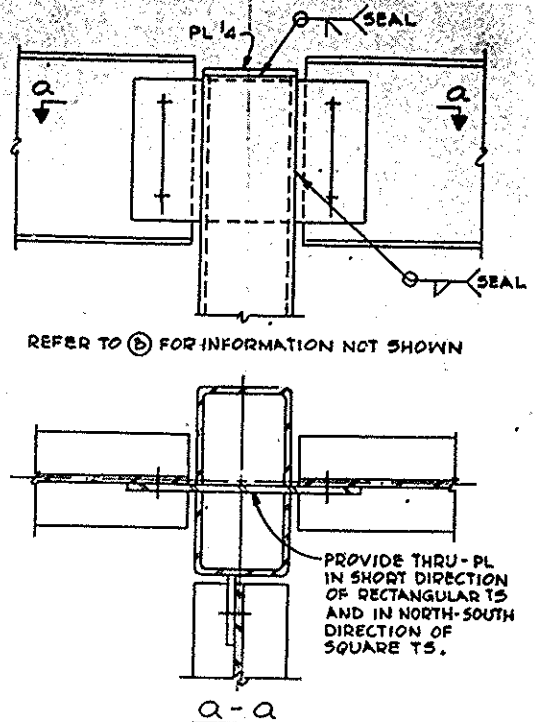


BEAM - COLUMN MOMENT CONNECTION

FOR TABLE AND NOTES SEE (C).



(E) CONNECTIONS



(F) CONNECTION OF BEAM TO T COLUMN

1. For extent of slab/deck type, see plans and details. For
description of slab/deck type, see schedule and details.
2. For spans with supports at both ends, provide deck proportioned
compositely to sustain the superimposed load indicated in
schedule, except that, for spans including trench headers,
provide deck proportioned non-compositely.
Provide deck proportioned also to satisfy the following
criteria for function as a form:
A. Dead load deflection limited to 1/180 of span or .75 in.,
whichever is smaller.
B. Steel stress limited to not more than 26700 psi for dead
load plus 200 lb. concentrated load at midspan or, steel
stress limited to not more than 20000 psi for dead load
plus 20 psf additional load, whichever is more severe.
3. For deck supporting cantilevers, provide deck proportioned
to satisfy the following criteria for function as a form:
A. Dead load deflection limited to 1/90 of overhang or .375
in., whichever is smaller.
B. Steel stress limited to not more than 26700 psi for dead
load plus 200 lb. concentrated load at outside end of
overhang or, steel stress limited to not more than 20000
psi for dead load plus 20 psf additional load, whichever is
more severe.
4. NW indicates normal weight aggregate concrete. LW indicates
lightweight aggregate concrete.
5. Provide additional concrete as required to compensate for
deflections of beams and of steel deck.

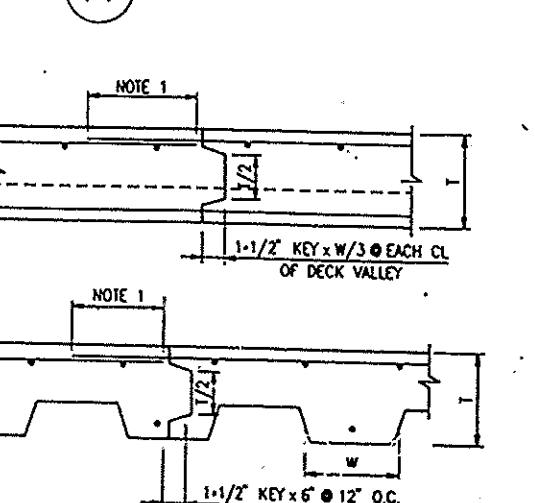
1. For extent of slab/deck type, see plans and details. For
description of slab/deck type, see schedule and details.
2. For spans with supports at both ends, provide deck proportioned
compositely to sustain the superimposed load indicated in
schedule, except that, for spans including trench headers,
provide deck proportioned non-compositely.
Provide deck proportioned also to satisfy the following
criteria for function as a form:
A. Dead load deflection limited to 1/180 of span or .75 in.,
whichever is smaller.
B. Steel stress limited to not more than 26700 psi for dead
load plus 200 lb. concentrated load at midspan or, steel
stress limited to not more than 20000 psi for dead load
plus 20 psf additional load, whichever is more severe.
3. For deck supporting cantilevers, provide deck proportioned
to satisfy the following criteria for function as a form:
A. Dead load deflection limited to 1/90 of overhang or .375
in., whichever is smaller.
B. Steel stress limited to not more than 26700 psi for dead
load plus 200 lb. concentrated load at outside end of
overhang or, steel stress limited to not more than 20000
psi for dead load plus 20 psf additional load, whichever is
more severe.
4. NW indicates normal weight aggregate concrete. LW indicates
lightweight aggregate concrete.
5. Provide additional concrete as required to compensate for
deflections of beams and of steel deck.

1. For extent of slab/deck type, see plans and details. For
description of slab/deck type, see schedule and details.
2. For spans with supports at both ends, provide deck proportioned
compositely to sustain the superimposed load indicated in
schedule, except that, for spans including trench headers,
provide deck proportioned non-compositely.
Provide deck proportioned also to satisfy the following
criteria for function as a form:
A. Dead load deflection limited to 1/180 of span or .75 in.,
whichever is smaller.
B. Steel stress limited to not more than 26700 psi for dead
load plus 200 lb. concentrated load at midspan or, steel
stress limited to not more than 20000 psi for dead load
plus 20 psf additional load, whichever is more severe.
3. For deck supporting cantilevers, provide deck proportioned
to satisfy the following criteria for function as a form:
A. Dead load deflection limited to 1/90 of overhang or .375
in., whichever is smaller.
B. Steel stress limited to not more than 26700 psi for dead
load plus 200 lb. concentrated load at outside end of
overhang or, steel stress limited to not more than 20000
psi for dead load plus 20 psf additional load, whichever is
more severe.
4. NW indicates normal weight aggregate concrete. LW indicates
lightweight aggregate concrete.
5. Provide additional concrete as required to compensate for
deflections of beams and of steel deck.

(G) SLAB/STEEL DECK

TYPE	DECK DEPTH (IN.)	SLAB DEPTH (IN.)	AGGREGATE	SUPERIMPOSED LOAD (PSF)	REINFORCING		REMARKS
					WWF OR REBAR GRID	BOTTOM BARS	
D1	2	4	LW	200	#5@7(N-S) #4@9(E-W)		BULKHEAD
D2	2	4 1/2	LW	200	6x6 W2.0x2.0		FUEL OIL TANK ROOM ROOF
D3	1 1/2	4	LW	200	6x6 W2.0x2.0		MISC.

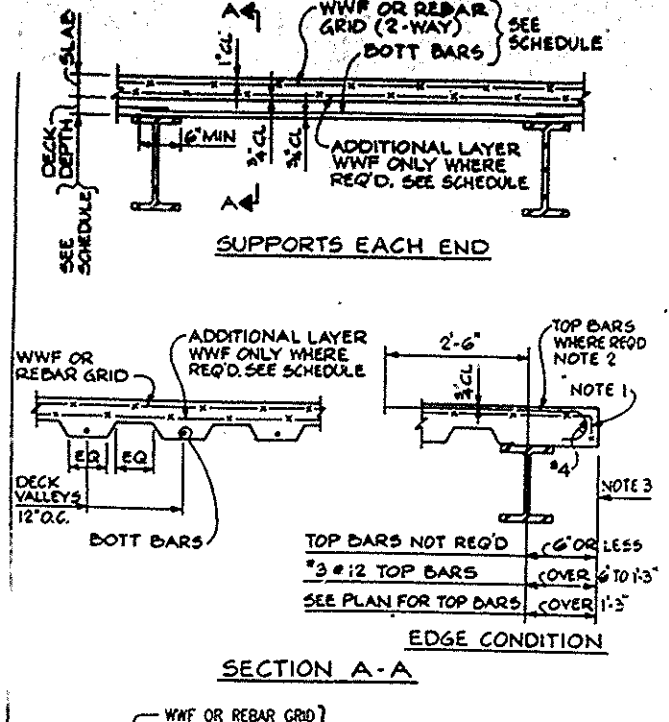
(H) SLAB/DECK



NOTE 1:
TENSION SPLICE IN REBAR GRID ONLY WHERE ACCEPTED
BY STRUCTURAL ENGINEER. STAGGER SPLICE.

CONSTRUCTION JOINT

(J) SLAB/DECK

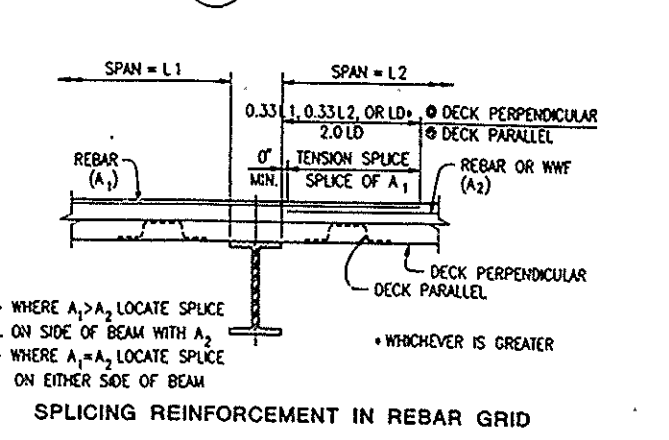


(K) SLAB/DECK

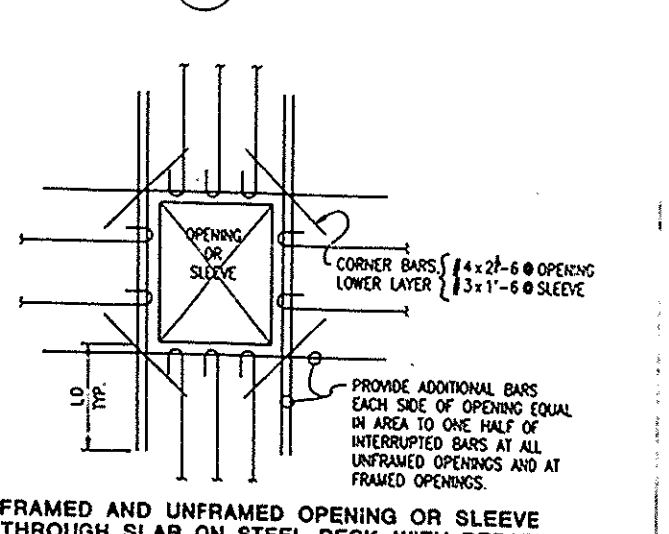
CANTILEVER	
E	TOP BARS
TO 7'	NOT REQUIRED
OVER 7' TO 2'-0"	#3@12
OVER 2'-0" TO 3'-6"	#4@12
OVER 3'-6" TO 4'-0"	#4@6

NOTES:
1. BEND OVER WWF. FOR REBAR GRID PROVIDE STANDARD HOOK.
2. WHERE GRID REBARS ARE EQUAL TO OR GREATER IN AREA PER
FOOT THAN REQUIRED TOP BARS, TOP BARS MAY BE OMITTED.
3. FOR LOCATION SEE PLAN. IF NOT NOTED IN PLAN OR SECTION,
EDGE OF SLAB IS FLUSH WITH EDGE OF FLANGE.

(L) SLAB/DECK



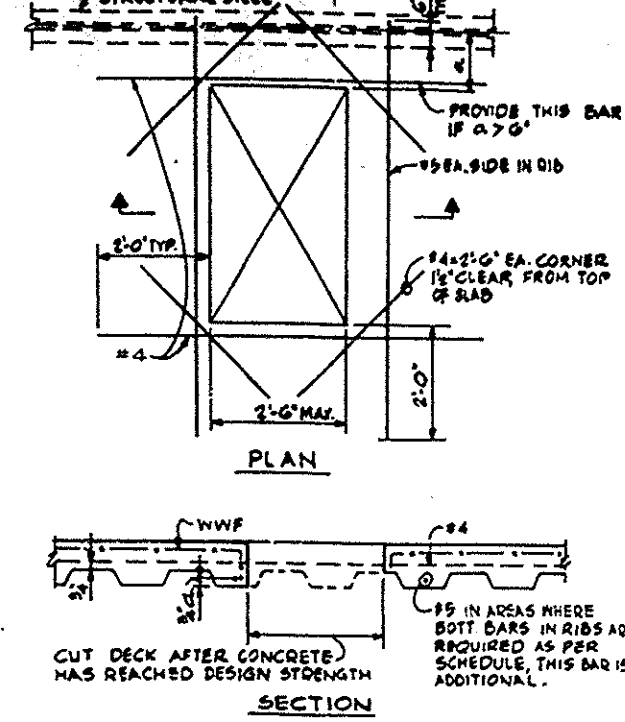
(M) SLAB/DECK



FRAMED AND UNFRAMED OPENING OR SLEEVE
THROUGH SLAB ON STEEL DECK WITH REBAR GRID

FOR BOTTOM BAR ARRANGEMENT SEE (C).

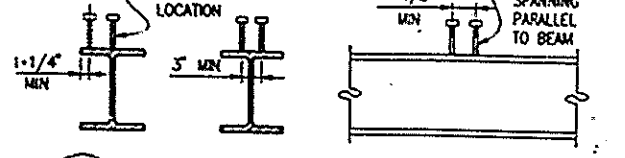
SIZE AND LOCATION OF OPENINGS NOT SHOWN IN
STRUCTURAL DRAWINGS SHALL BE SUBMITTED TO THE
STRUCTURAL ENGINEER FOR REVIEW.



(N) SLAB/DECK

1. WHERE DECK SPANS PERPENDICULAR TO BEAMS, THE SHEAR CONNECTORS
SHALL BE PLACED IN VALLEYS WITH A MAXIMUM OF 2 SHEAR CONNECTORS
PER VALLEY, UNLESS OTHERWISE NOTED. SHEAR CONNECTORS SHALL BE
KEPT CLEAR OF DECK ENDS, SEAMS, AND EMBOSSEMENTS. SHEAR
CONNECTORS SHALL NOT BE PLACED UNDER OR WITHIN 3' OF TRENCH
HEADERS OR ELEVATORS SHEAR BEAMS.
2. WHERE A SINGLE NUMBER IS INDICATED [] IN PLAN, THE NUMBER OF
SHEAR CONNECTORS SHALL BE DISTRIBUTED UNIFORMLY ALONG THE
LENGTH OF THE BEAM, UNLESS OTHERWISE NOTED.
3. WHERE A SINGLE NUMBER IS INDICATED [] IN PLAN AND THE EXTENT IS
DESIGNATED BY ARROWS, THE NUMBER OF SHEAR CONNECTORS SHALL BE
DISTRIBUTED UNIFORMLY ALONG THE DESIGNATED LENGTH.
4. WHERE [MIN] IS INDICATED IN PLAN, PROVIDE SHEAR CONNECTORS AT
24" O.C.
5. UNIFORM SPACING ON BEAMS WITH DECK SPANNING PERPENDICULAR
SHALL BE ACHIEVED AS FOLLOWS:
• WHERE THE NUMBER OF SHEAR CONNECTORS IS LESS THAN THE
NUMBER OF VALLEYS, INTERMAX 12" AND 24" SPACING.
• WHERE THE NUMBER OF SHEAR CONNECTORS IS GREATER THAN THE
NUMBER OF VALLEYS, INTERMAX ONE SHEAR CONNECTOR PER VALLEY
WITH TWO SHEAR CONNECTORS PER VALLEY APPLICATION, WITH A
MAXIMUM SPACING OF 12" O.C.

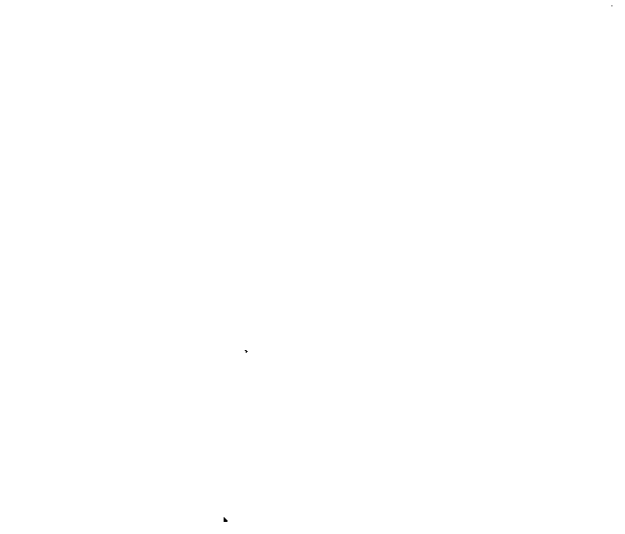
(P) STUD SHEAR CONNECTORS



(Q) STUD SHEAR CONNECTORS

1. WHERE $A_1 > A_2$ LOCATE SPLICE
ON SIDE OF BEAM WITH A_2
2. WHERE $A_1 = A_2$ LOCATE SPLICE
ON EITHER SIDE OF BEAM

(R) STUD SHEAR CONNECTORS



(S) STUD SHEAR CONNECTORS

1. WHERE $A_1 > A_2$ LOCATE SPLICE
ON SIDE OF BEAM WITH A_2
2. WHERE $A_1 = A_2$ LOCATE SPLICE
ON EITHER SIDE OF BEAM

(T) STUD SHEAR CONNECTORS

1. WHERE $A_1 > A_2$ LOCATE SPLICE
ON SIDE OF BEAM WITH A_2
2. WHERE $A_1 = A_2$ LOCATE SPLICE
ON EITHER SIDE OF BEAM